

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. – 5. (cancelled)

6. (currently amended) A microsensor for sensing a substance comprising:

a substrate;

a source of light;

an optical microresonator fabricated in the substrate exposed to the substance to allow an interaction between the microresonator and substance;

a waveguide coupling the source of light to the optical microresonator; and

a detector coupled to the microresonator to measure a performance parameter of the optical microresonator sensitive to interaction of the substance with the optical microresonator.

~~The microsensor of claim 1~~ where the performance parameter is the absorption loss of whispering gallery modes in the microresonator.

7. – 14. (cancelled)

15. (currently amended) A microsensor for sensing a substance comprising:

a substrate;

a source of light;

an optical microresonator fabricated in the substrate exposed to the substance to allow an interaction between the microresonator and substance;

a waveguide coupling the source of light to the optical microresonator; and

a detector coupled to the microresonator to measure a performance parameter of the optical microresonator sensitive to interaction of the substance with the optical microresonator.

~~The microsensor of claim 1~~ where the waveguide comprises a CMOS fabricated waveguide and the detector ~~is~~ comprises a detector deposited onto the CMOS fabricated waveguide.

16. – 17. (cancelled)

18. (currently amended) A microsensor for sensing a substance comprising:

a substrate;

a source of light;

an optical microresonator fabricated in the substrate exposed to the substance to allow an interaction between the microresonator and substance;

a waveguide coupling the source of light to the optical microresonator; and

a detector coupled to the microresonator to measure a performance parameter of the optical microresonator sensitive to interaction of the substance with the optical microresonator.

~~The microsensor of claim 1~~ where the microresonator is characterized by an optical absorption loss determined by direct optical excitation of the substance when in contact with the microresonator.

19. (Original) The microsensor of claim 18 further comprising a plurality of microresonators corresponding to a plurality of different resonant frequencies to generate an absorption spectrum of the substance.

20. – 25. (cancelled)

26. (currently amended) A microsensor for sensing a substance comprising:
a substrate;
a source of light;
an optical microresonator fabricated in the substrate exposed to the substance to
allow an interaction between the microresonator and substance;
a waveguide coupling the source of light to the optical microresonator;
a detector coupled to the microresonator to measure a performance parameter of
the optical microresonator sensitive to interaction of the substance with the optical
microresonator; and

~~The microsensor of claim 1~~ further comprising a plurality of microsensors organized in an addressable array on the substrate, ones of the plurality of microsensors being resonant at or tuned to different optical frequencies, absorption losses of the plurality of microsensors being measured as a result of optical coupling

between an analyte and ones of the resonators as determined by the resonant frequency of the microresonator and the absorption peak of the analyte, whereby an absorption spectrum of direct spectroscopy of an analyte or absorption of antibody-linked fluorescent molecules used as markers are measured.

27. – 30. (cancelled)

31. (currently amended) A microsensor for sensing a substance comprising:

a substrate;

a source of light;

an optical microresonator fabricated in the substrate exposed to the substance to allow an interaction between the microresonator and substance;

a waveguide coupling the source of light to the optical microresonator;

a detector coupled to the microresonator to measure a performance parameter of the optical microresonator sensitive to interaction of the substance with the optical microresonator;

a plurality of microresonators and a corresponding plurality of detectors formed into an array coupled by the waveguide to the light source in which the plurality of microresonators are exposed to a plurality of substances;

an addressing circuit for reading the array; and

a CMOS integrated read-out circuitry fabricated in the substrate coupled to the addressing circuit.

~~The microsensor of claim 13~~ where the CMOS integrated read-out circuitry provides diagnostic information on the condition of sensor performance and electronic intelligence in a read-out process.

32. (Original) The microsensor of claim 31 further comprising a wireless interface fabricated on the substrate and communicated to the read-out circuitry.

33. – 37. (cancelled)

38. (currently amended) A method for sensing a substance comprising:
providing a substrate;
providing a source of light;
communicating the light through a waveguide coupled to the source of light to an optical microresonator fabricated in the substrate exposed to the substance to allow an interaction between the microresonator and substance; and
detecting the interaction between the microresonator and substance by measurement of a performance parameter of the optical microresonator,
where detecting the interaction between the microresonator and substance comprising detecting, the optical performance of a semiconductor optical ring microresonator;
where detecting the optical performance of a semiconductor optical ring microresonator comprises measuring the optical performance of a microresonator with an initial Q of 10,000 or greater,

~~The method of claim 36~~ where measuring the optical performance of a microresonator comprises measuring the absorption loss of whispering gallery modes in the microresonator.

39. – 57. (cancelled)

58. (currently amended) A method for sensing a substance comprising:
providing a substrate;
providing a source of light;
communicating the light through a waveguide coupled to the source of light to an optical microresonator fabricated in the substrate exposed to the substance to allow an interaction between the microresonator and substance;
detecting the interaction between the microresonator and substance by measurement of a performance parameter of the optical microresonator; and

~~The method of claim 33 further comprising~~ providing a plurality of microsensors organized in an addressable array on the substrate, ones of the plurality of microsensors being resonant at or tuned to different optical frequencies, measuring the absorption losses of the plurality of microsensors as a result of optical coupling between an analyte and ones of the resonators as determined by the resonant frequency of the microresonator and the absorption peak of the analyte, and generating an absorption spectrum of direct spectroscopy of an analyte or absorption of antibody-linked fluorescent molecules used as markers are measured.

59. – 62. (cancelled)

63. (currently amended) A method for sensing a substance comprising:

providing a substrate;

providing a source of light;

communicating the light through a waveguide coupled to the source of light to an optical microresonator fabricated in the substrate exposed to the substance to allow an interaction between the microresonator and substance; and

detecting the interaction between the microresonator and substance by measurement of a performance parameter of the optical microresonator;

providing a plurality of microresonators and a corresponding plurality of detectors configured into an array coupled by the waveguide to the light source and exposing the plurality of microresonators to the substance or plurality of substances;

fabricating an addressing circuit on the substrate for reading the array;

fabricating CMOS integrated read-out circuitry in the substrate coupled to the addressing circuit; and

~~The method of claim 45 further comprising~~ generating diagnostic information on the condition of sensor performance and electronic intelligence by means of the integrated read-out circuitry.

64. (currently amended) A method for sensing a substance comprising:

providing a substrate;

providing a source of light;

communicating the light through a waveguide coupled to the source of light to an optical microresonator fabricated in the substrate exposed to the substance to allow an interaction between the microresonator and substance; and

detecting the interaction between the microresonator and substance by measurement of a performance parameter of the optical microresonator;

providing a plurality of microresonators and a corresponding plurality of detectors configured into an array coupled by the waveguide to the light source and exposing the plurality of microresonators to the substance or plurality of substances;

fabricating an addressing circuit on the substrate for reading the array;

fabricating CMOS integrated read-out circuitry in the substrate coupled to the addressing circuit; and

~~The method of claim 45 further comprising fabricating a wireless interface on the substrate communicated to the read-out circuitry.~~